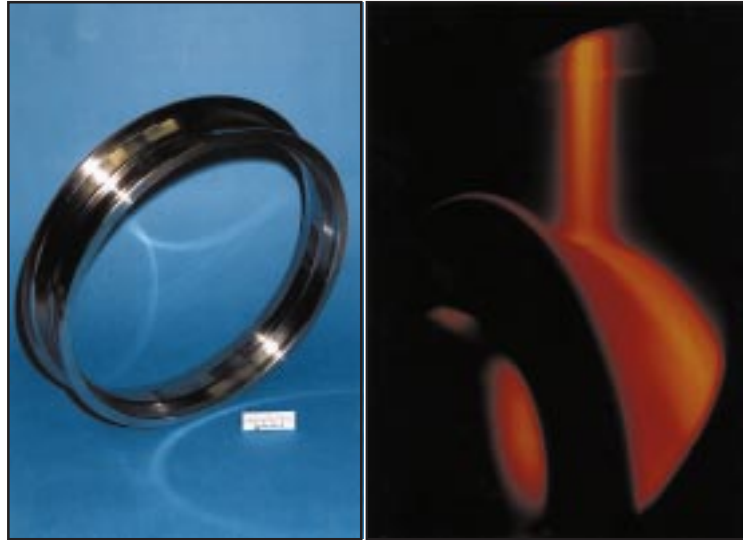




# SPRAY FORMING TECHNOLOGY

## STREAMLINES MANUFACTURING PROCESS



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### Payoff

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Spray forming has the potential to reduce the cost of manufacturing aircraft gas turbine engine casings and structural rings in military engines by as much as 30 percent. Incorporation of spray forming technology could result in projected annual savings of \$40 million for U.S.-based engine manufacturers. Similar cost savings using sprayformed nickel-based superalloys are projected for commercial aerospace applications.

### Accomplishment

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A research effort managed by the Air Force Research Laboratory's (AFRL's) Materials and Manufacturing Directorate (ML) and sponsored by the Defense Advanced Research Projects Agency (DARPA) led to the successful development of a revolutionary process that streamlines aircraft gas turbine engine manufacturing. The new process, called sprayforming, eliminates most of the steps used to make aerospace rings and casings for gas turbine engines and lowers the materials costs of components by as much as 30 percent. The new process also enables rapid response prototyping, small lot production and reduces the lead-times for component deliveries. The successful transfer of sprayforming technology to the aerospace industry, already in progress, will also provide a major edge in a global components market exceeding \$270 million and could save U.S.-based engine manufacturers more than \$40 million a year.

### Background

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Aside from flight safety and system performance concerns, a critical element in military aircraft design and development has always been how to speed up production while lowering production costs. Developed under a \$13 million DARPA research program, sprayforming uses a direct one-step conversion approach for superalloy ingots, near net shape capability and rapid metal deposition rates to provide a highly effective alternative fabrication process. Sprayformed superalloy components exhibit mechanical behavior characteristics comparable to current forged and wrought components but at a significantly reduced production cost. Sprayformed materials have a more uniform homogeneous microstructure resulting in improved machinability and inspectability and fewer billet-related defects. The primary contractors involved in the development of sprayforming for rings and casings, Pratt & Whitney and Howmet, have formed a joint venture, Sprayform Technologies International (STI). Currently, high pressure turbine (HPT) and high pressure compressor (HPC) casings are being certified for insertion in the F100 and F119 families of gas turbine engines. In addition, Pratt & Whitney has identified more than 20 mature engine parts for sprayform processing using IN718, Waspoly and Thermospan superalloys with a projected cost savings of \$5 million per year.